

USAID/GEO

Guyana Economic Opportunities

DRAFT REPORT

PRELIMINARY OVERVIEW OF THE FISHERIES SECTOR

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Foreword

The Guyana Office for Investment (Go-Invest) requested assistance in developing investment profiles of priority economic sectors. The Guyana Manufacturers' Association (in conjunction with the Ministry of Tourism, Industry and Commerce) has also requested assistance in developing sector profiles as a policy tool to identify strengths, weaknesses and needed policy changes to help grow various sectors. The purpose of this report is to support the development of those profiles, by providing an initial overview of one of the fisheries sector. This report is not intended as a definitive assessment of the sector. Instead its purpose is to provide an initial overview through a review of existing reports and through preliminary discussions with those involved in the sector. Due to the timing of the exercise at the end of the GEO project, there was unfortunately not sufficient time to complete the work in developing the two profiles, one for potential investors and one for policy makers. It is hoped that this initial work will contribute to the production of the final profiles.

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Executive Summary

Historically, the Guyana economy has been dependent on production from a handful of primary products. Sugar, rice, gold, bauxite and timber were the dominant players. Within recent times the seafood sector has emerged as a key contributor to GDP, foreign exchange and employment. This is not surprising as the Exclusive Economic Zone which is equivalent to 64% of the country's land mass, abounds with natural resources.

Over the past ten years the seafood sector has consistently contributed approximately 2.9% to the country's GDP. Export sales have now reached US\$54 million and fisheries replaced rice as the third ranking foreign exchange earner in 2003.

Seafood harvesting was traditionally an artisanal activity that subsidized family and village income and supplemented protein intake. Starting in the early 1960s the industrialization of the sector commenced with the establishment of a trawler base at Providence, East Bank Demerara. Foreign trawlers utilized this facility as a landing site for the processing and trans-shipment of prawns catch. Fish by-catch was sold locally.

The Maritime Boundaries Act 1977 established the Fisheries Zone which provided a 12-mile limit for exclusive fishing. In 1991 the Exclusive Economic Zone (EEZ) conferred exclusive fishing rights to a 200-mile limit. Foreign owned trawlers in the post-1977 period and specifically after 1991 were replaced by a combination of locally and foreign owned vessels. Fisheries operation became nationally owned.

Shrimp, prawns and various finfish have been harvested for local consumption and export. Circa 1985, attention was focused on a larger type shrimp, harvest levels of which increased annually. By 1994 it was evident that full-scale commercialization of seabobs was financially viable. In 1996 the industrialization of seabob harvest began with the refitting of a number of prawns' trawlers. Full production integration was accomplished as the harvesters constructed processing plants, and exported, packaged seabobs, directly to foreign buyers.

By this time prawns production was on the decline and the Government of Guyana had started privatization of its fishery assets. These factors resulted in a number of trawlers being converted to seabob trawlers. Seabobs became the dominant contributor to the sector's performance as it commenced a growth trend.

In 1995 the Government of Guyana requested a study of the sector which was sponsored by CIDA. Since then a number of other studies, workshop discussions and other FAO and Caricom Fisheries Unit reports have indicated that fisheries resources were being harvested without an appropriate assessment of sustainability. Some species were assessed as over-exploited. The number of fishing vessels and processing plants increased rapidly, especially between the 1996-2003 period. The Department of Fisheries, the agency responsible for monitoring, regulating and enforcing fisheries activities, is greatly handicapped by staff vacancies which has averaged 44.5% over the last ten years. Within the last three years, the Department of Fisheries has operated without the three most senior officers. The formulation of policies, creation of up to date fishing regulations and general enforcement were neglected as the depleted staff attended to administrative and revenue collection activities. In 2002 an FAO study confirmed that *"the DOF is in a critical, emergency situation from a structural and operational point of view"*. As a result, seafood enterprises have operated with minimal controls and regulations. Ninety-five (95) seabob fishing licenses have been issued, 55 more than the established limit. By-catch limits have not been reviewed or modified to address current harvesting levels. In the absence of executive management,

decision making and authorization capabilities have suffered. Some critical regulations are dated and ineffective in today's rapidly evolving fisheries environment.

The 1300 Artisanal fishery operators provide fish and white belly shrimp for local consumption. This group is a source of employment especially in the non-urban areas. However fishing gear and harvesting practices are harmful to fisheries stock. Chinese seines and small gauge nylon nets are decimating the juveniles of all species. Since 1995 concerns have been expressed on the rate of harvest and sustainability of fisheries stock. Every study or forum since then has reconfirmed these concerns. In the absence of recent scientific assessments, studies are continuing to extrapolate rates of harvest and ratio of by-catch from production figures. The results are showing declines and harmful trends. These production figures could actually be vastly understated.

During a number of interviews conducted for this report, a wide cross section of operators estimated that recorded data are only 60-70% of actual production. Another 15% of the higher priced harvest, prawns and seabobs, are sold 'over-the-side' at sea.

Seafood production has emerged as a major contributor to the country's GDP, export earnings, and employment level. These gains could be short term and detrimental to the future of the industry. The future of the sector and its sustainability require immediate attention.

The three most urgent issues requiring immediate action are:

1. Seabob Licenses
2. Inadequate By-Catch Level for Seabob Vessels
3. Restructuring and Re-Staffing of the Department of Fisheries

I Background

Physical Profile

Located on the northern coast of South America, with a land area of 215,000 square kilometers, Guyana is approximately the size of the United Kingdom. It is inhabited mostly along the coast, where the commercial and agricultural belts are located.

Traditionally the country is divided into four types of landforms as quoted in the National Development Strategy (NDS):

1. The flat clayey coastal belt, which is mostly below or at sea level and where agricultural activities occur.
2. The sandy belt starts around the International airport, and extends to include the intermediate Savannahs.
3. The vast peneplain area encompassing the tropical forests, extensive mineral deposits and the Rupununi Savannahs, extending over half of the country from the sandy belt to the southern border.
4. The Guyana Highlands, which are the mountainous areas and includes the Pakaraima Range.

These areas offer a wide variety of natural resources, which form the basis for the country's economy. The agricultural coastal plain is the home of sugar and rice production. In the other areas the tropical hardwood forest supports the timber industry while the mining sector has harvested gold, diamonds, bauxite and other ores.

Exclusive Economic Zone

In recent years a fifth area has made its presence known. The economic potential of the fisheries resources and the possibility of finding oil have drawn attention to the Atlantic Ocean, north of the other economic areas. The abundant waterways and the coastal oceanic areas are recently proving to be a key contributor to the country's exports and GDP. This area, specifically the continental shelf, which is part of the country's Exclusive Economic Zone (EEZ), has a coastline of 432 kilometers and an area of approximately 38,000 square kilometers. In perspective the continental shelf is approximately another 18% of the landmass. The EEZ provides exclusive fishing rights for 138,240 square kilometers, an area that is equivalent to 64% of the country's landmass.

Resources - Geographical Profile

Atlantic Coastal Area and Continental Shelf

Bordered entirely by the ocean, the country's northern boundary starts in the East from the Suriname border and extends 432 kilometers to the Venezuelan border in the West. While Maritime laws confer territorial rights to 320 kilometers (200 miles) into the ocean, the continental shelf extends for approximately 112 kilometers. It ranges from 150 to 165 kilometers in the area between Suriname and East of the Essequibo river mouth. West of the Essequibo River, the shelf narrows to approximately 75 kilometers with frequent intrusion from mud and sand banks, some of which are nomadic. The total shelf area is approximately 38,000 square kilometers. This shelf area is 28% of the Exclusive Economic Zone.

Effects of Tides and Rivers

The main rivers of this region affect fish harvesting in different ways. Tides, currents and outflow from the rivers have different effects on the various ecosystems. Guyana's main rivers, the Essequibo, Demerara, Berbice and Corentyne, and the continent's Amazon River influence the ecosystem in the Suriname/Guyana Fishery Zone. This area extends from French Guiana to the Essequibo River. The

Oronoco, which exits the continent in Venezuela, is responsible for the ecosystem west of the Essequibo River. The fresh water discharge from these rivers and the accompanying muddy deposits, which are part of the tidal influences, provide the nutrients for invertebrate life in the immediate regions of the continental shelf. The mud bottom extends to approximately 40 kilometers to a depth of about 40 meters. Here, the invertebrates are the start of a food chain that in turn provide the nutrients for shrimps, other crustaceans and bottom dwelling finfish demersal category. The tides affect the levels of salinity and encourage the constant shifting of sandbanks. While the effects of inland water based mining operations are visible in the outflows and in the ocean, there are no scientific studies on their effect on the fishing resources. The country's coastline runs in a Northwesterly direction and the Guyana current of the Atlantic Ocean runs parallel to this coastline starting in the Cayenne area and extending throughout the Guianas.

Continental Slope

The bottom slopes gradually to a depth of about 100 meters at approximately 100 kilometers from the shore, where it plunges (to the ocean's depth) at an acute gradient. The continental slope is divided into four distinct fishery zones based on different ecosystems. The zones are distinguishable by the colour of water, composition of the ocean floor and the fisheries stock of each ecosystem. Above the surface, fishing vessels, harvesting equipment and harvesting techniques are also different. Noticeable in these zones are the different capital costs of the equipment utilized by the harvesters. While fisheries harvesting opportunities occur in the four zones, only the first three innermost are harvested by Guyanese vessels.

Continental Shelf & Atlantic Coast Profile

Water	← FRESH WATER from Rivers→			←GUYANA CURRENTS→			
Colour	Brown Muddy		Green	Aquamarine Light Blue		Dark Blue	
Bottom	Soft Mud		Mud/Sand	Sand		Coral	
Crustaceans	Seabobs	White Belly	Seabobs	Prawns			
Finfish	Catfishes Bangamary		SCIANEIDS	CARANGIDS Grunts		Snappers Groupers	
Fishing methods	Seines Cadell		Seabob Trawling	Prawns Trawling			
	Gillnet			Hand lines			
Vessels	Artisanal wooden		Trawlers	Trawlers		Wooden hand liners	
Distance Miles	→10	→20	→30	→40	→50	→60	→70
Depth Metres	← 20 →		→ 60	→100		→120	Shelf Slope

Fisheries Harvesting Zones

Artisanal Fishermen Area – Zone 1

<p><i>Characteristics</i></p> <p>Colour of Water - Muddy brown</p> <p>Width from shore - 0 – 16 kilometers</p> <p>Depth - 0 – 20 meters</p> <p>Bottom - soft mud</p> <p>Resources - Demersal and Crustacean area Shrimp and Seabobs Bottom dwelling finfish Catfish</p>	<p><i>Fishing Methods/Equipment</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Pin Seine <input type="checkbox"/> Chinese Seine <input type="checkbox"/> Gillnets <input type="checkbox"/> Drift nets <input type="checkbox"/> Cadell lines
<p><i>Vessels</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Artisanal <input type="checkbox"/> 1300 vessels <input type="checkbox"/> Smaller wooden boats <input type="checkbox"/> Outboard engines <input type="checkbox"/> Locally made equipment 	<p><i>Other Characteristics</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Seasonal <input type="checkbox"/> Tidal/Diurnal

General Profile – Zone 1

Approximately 1300 artisanal, or small scale localized fishing vessels, harvest resources from this, the closest fishing zone. It is estimated and generally agreed that about 80% of these are owner-operated and collectively employ about 4500 to 5000 persons. A large number of these operations work on a part-time, seasonal basis to supplement family income during the rice and sugar off-seasons. Statistics, reports and information are generally unavailable as many operate outside of the Income Tax and National Insurance systems. While the larger of these entities are commercial enterprises, the majority supplement family income and protein consumption.

Vessels range from six to eighteen meters, constructed from wood by local craftsmen and are generally propelled by small outboard engines and sometimes supplemented by sails. Operations are mostly tidal that is diurnal. Some larger vessels, which are more full-time commercial, are equipped with iceboxes and could stay at sea 10 to 14 days. While most vessels have no decks, the larger provide sheltered sleeping and living areas.

Harvesting is mostly by various types of seines or baited cadell lines. There are no restrictions or regulations pertaining to the mesh size of nets. In some instances nets would trap a wide cross section of seafood, ranging from smallest shrimp to large fish. Juveniles of all species are caught by the nets and baited lines. Juveniles and non-food catch are discarded at sea.

Industrial Seabob Area – Zone 2

<p><i>Characteristics</i></p> <p>Colour of water - Muddy green, mostly green</p> <p>Width from shore - 16 – 50 kilometers</p> <p>Depth - 20 – 50 meters</p> <p>Bottom - Mud/sand mixture</p> <p>Resources - Seabobs Sciaenid (Croakers) Bashaws Bangamary Sea Trout Snapper</p>	<p><i>Fishing Methods/Equipment</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Trawling equipment <input type="checkbox"/> Pin seines and Nets <input type="checkbox"/> Some hand lines
<p><i>Vessels</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Seabob trawlers <input type="checkbox"/> Larger wooden boats <input type="checkbox"/> Turtle Excluding Device (TED) equipped trawlers 	<p><i>Other Characteristics</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Commercial full-time <input type="checkbox"/> Converted prawns trawlers <input type="checkbox"/> Local and foreign owned seabob trawlers <input type="checkbox"/> Majority owned by processing plants <input type="checkbox"/> Locally owned wooden boats <input type="checkbox"/> Fishing duration 10-15 days

General Profile – Zone 2

As at year-end 2003 there were 95 licensed seabob trawlers fishing in this zone. An unknown number of larger sized, locally made artisanal vessels also worked in this area. The latter mostly harvest fish. The majority of trawlers are owned by a small group of seafood processors who are also in the export business. These vessels, some of them converted prawns trawlers, have relatively modern equipment and technology from communication to global positioning system (GPS) capability. Vessels are not refrigerated and their stay at sea is influenced by chilling capabilities and rate of harvest. The wooden vessels utilize gillnets and baited lines to catch fish stock. Nets and hooks are not regulated, hence juveniles of all species are the discards during harvest. Large volumes of by-catch occur. Trawlers are equipped with Turtle Excluding Devices (TED).

Prawns Area – Zone 3

<p><i>Characteristics</i></p> <p>Colour of Water - Light Blue</p> <p>Width from shore - 50 – 80 kilometers</p> <p>Depth - 20 – 50 meters</p> <p>Bottom - Sand</p> <p>Resources - Prawns Grunts Carangids Red Snapper, Grouper</p>	<p><i>Fishing Methods/Equipment</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Trawling equipment <input type="checkbox"/> Hand lines <input type="checkbox"/> Fish traps
<p><i>Vessels</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Prawns trawlers <input type="checkbox"/> Larger wooden boats <input type="checkbox"/> TED equipped 	<p><i>Other Characteristics</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Commercial full-time <input type="checkbox"/> Foreign ownership <input type="checkbox"/> Locally owned wooden boats <input type="checkbox"/> Reports of foreign vessels

General Profile – Zone 3

These trawlers are refrigerated vessels, fully equipped with modern technology such as GPS, navigational and communication systems. Capable of staying at sea for long periods, up to eight weeks. Fish traps that were introduced within the last ten years are not regulated or controlled. They do not discriminate against harvest size.

Deep Sea Fishing – Zone 4

<p><i>Characteristics</i></p> <p>Colour of Water - Dark Blue</p> <p>Width from shore - 100 kilometers and beyond</p> <p>Depth - 100 meters to shelf edge</p> <p>Bottom - Coral to ocean bottom</p> <p>Resources - Deep sea Pelagics Larger fish/Schools Tuna</p>	<p><i>Fishing Methods/Equipment</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Nets <input type="checkbox"/> Lines <input type="checkbox"/> Fish traps
<p><i>Vessels - Required</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Large capacity ocean vessels <input type="checkbox"/> Catching fleet <input type="checkbox"/> Factory ships 	<p><i>Other Characteristics</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Requires large capital investment <input type="checkbox"/> Reports of foreign vessels

General Profile – Zone 4

There is minimal harvest from this zone. It is harvested mostly by accident by some of the hand liners who generally operate in Zone 3. There are unconfirmed reports of a small number of foreign ships operating in this area. Exploiting this sector will require relatively large capital investment and is an opportunity for growth for the fisheries sector.

Environmental and Conservation Issues

Some concerns not related to the exploitation and depletion of fisheries stock are receiving the attention of the authorities and operators of the fishing vessels. Two main concerns are the changing visual characteristics of the outflow from the rivers and the exclusion of certain species during fish harvesting.

Impact of inland mining

The captains of the fishing vessels interviewed expressed concerns about the changing colour of water flowing from inland due to gold mining operations. In recent years this outflow is expanding and creating a broad band along the coastline, especially at the mouth of the Essequibo River. The impact on fisheries stock is unknown.

Turtle excluding devices

All trawlers are outfitted with TEDs to provide an escape for turtles and dolphins entrapped during trawling operations. It is generally believed, however, that while TED is an international regulation and is being complied by all such vessels, trawling activities do not pose significant danger to the turtles and dolphins. Vessels trawl at a speed of approximately two to four miles per hour as the gear moves along the ocean bottom. The turtles and dolphins inhabit the upper layer of the ocean as they need air. Air breathers such as turtles and dolphins are able to avoid slow moving trawling equipment. They are more likely to become entangled and trapped by nets. These are the observations of the DOF and the captains of the trawlers and larger artisanal fishing vessels.

II The Fisheries Infrastructure

While Fisheries is one component of the agricultural sector, it exhibits characteristics of an industry. It covers a diverse range of operations from harvesting of natural products, processing, minimal value adding, followed by export sale. Some businesses are fully integrated and operate in all facets of fishing, from capture to export. It includes wharves, vessels, processing plants, ice makers, local sales outlets, export sales, maintenance and repairs, training facilities and boat building. Many businesses operate within a small spectrum of the entire industry. Many operations specialize in only one facet of the industry. However, the larger businesses tend to operate in selected bands of the spectrum. While some may own vessel(s) and sell their catch to a larger processing plant, others may have a landing site, own vessels and sell ice or fuel.

Some operations are organized into associations/groups while the majority operate independently. While the “stand alone operators” out-number the associations’ members, their production is vastly exceeded by the organized operators. There are two associations The artisanal fishers who make up the larger group are members of the Fishing cooperative societies across the country. The trawler owners and processing plant operators are the second group, smaller in numbers and are mostly located within a few miles of the Demerara Harbour to facilitate access to the Atlantic Ocean, international shipping facilities and available sources of labour.

Fishing Cooperative Societies

There are twelve established Fishing Cooperatives that are registered. However, only four are fully operational. Some of these co-ops were associated with fishing complexes which were funded by the European Union (EU) and Canadian International Development Agency (CIDA) during the 1987 to 1993 period.

Seven complexes were constructed, utilizing donor funds under the Artisanal Fisheries Infrastructure Programme (AFIP). The four active societies are beneficiaries of the AFIP. Over the years, the number

of societies ranged up to 13. Many became defunct and some united in a loose federation of societies to form a more stable group. When they were formed, these societies were able to access equipment and supplies through bilateral programmes. They were able to combine their resources to access fuel, ice and spares during the scarcities in the 1980 to early 1990 period. The societies were located along the coast from the East in the Corentyne to the West at Morawhana. Active Co-ops are designated with a star ✨.

Established Fishing Co-Op Societies

- Upper Corentyne Fishing Co-op Society Ltd. - #66 Village ✨
- # 43 Village Fishing Co-op Complex
- Rosignol Fishermen Co-op Society Ltd., Berbice ✨
- E.C.D. Fishing Co-op Society Ltd. – Annandale, ECD
- Lower East Coast Fishing Co-op Society Ltd. – Lusignan, ECD
- Greater Georgetown Fishing Co-op Society Ltd. - Meadow Bank, EBD ✨
- Region 3 Fishing Co-op Society Ltd. – Parika, EBE ✨
- Essequibo Fishing Co-op Society Ltd. – Lima, Essequibo
- North West Fishing Co-op Society Ltd. – Morawhana
- Charity Fishing Co-op Society Ltd., Essequibo
- Leguan Fishing Co-op Society Ltd., Essequibo
- Wakenaam Fishing Co-op Society Ltd., Essequibo

Meadow Bank Complex

The largest artisanal docking facility is at Meadow Bank. This complex is the main landing site for vessels from across the country. Providing most of the supporting and ancillary services for the vessels, this is the main interface between fishermen and the wholesalers, processor or exporters.

Parika Co-op Society

The #3 Fishing Co-op Society located at Parika and established originally for fishermen on the Essequibo coast now serves as the umbrella body for the non-active Leguan and Wakenaam societies as well as the Essequibo coast.

Objectives of the Artisanal Fisheries Infrastructure Programme (AFIP)

Initially the objectives of the AFIP were:

- The reduction of post-harvest loss and to increase the supply of fish to the local market and for export.
- To increase the productivity and incomes of artisanal fishermen.
- To move the Co-operatives towards the roles of processors and marketers.

The lack and quality of data on the operations of Co-operatives and their members continue to provide hindrances to assessing their performance. Generally it is felt that the first objective has been attained. The production level has increased, but no data is available to assess the other factors. Co-operatives continue to suffer from inactive membership levels and as resources and supplies become more commercially available, members tend to become independent. As the supply and service roles of co-ops diminished the role of advocacy and lobbying emerges only when required.

Guyana Association of Trawler Owners and Seafood Processors

The industry is led by seven (7) larger business entities which are fully integrated operations. They own and operate fleets, wharves, processing plants and export facilities with all supporting and ancillary functions. These businesses account for approximately 90% of all exports of seafood. While this association has seven (7) members, there are eight (8) registered industrial seafood processors. DOF records show also an additional ten (10) small seafood processing plants, seven (7) smaller cottage industry processors and five (5) storage facilities which trade in frozen fish. There is some trading amongst these entities as various products are traded according to business specialization.

(See Annex for listing of businesses)

The association members are:

1. B.E.V. Processors
2. B. M. Enterprise
3. Georgetown Seafoods & Trading Company Limited
4. Noble House Seafoods
5. P.B.S. Investment Limited
6. Pritipaul Singh Investment Limited
7. Guyana Quality Seafoods

The Department of Fisheries – Responsibilities and Functions

The DOF has as its mandate the management, regulation and promotion of the exploitation and development of Guyana's fisheries resources. The department's authority was originally contained in the Fisheries Act of 1957 and redefined by the Fisheries Act 2002. It reports to the Minister of Agriculture, through the Permanent Secretary, and is organized under four sub programmes: Programme Administration, Legal and Inspectorate, Research and Development, and Extension. A 10-year analysis of DOF staffing shows a high percentage of vacancies. Full staff complement requires approximately 50 employees while the average vacancy over this period was 44.5%. As at the end of 2003 the three most senior administrative positions were vacant. The acting Chief Fisheries Officer also serves as Chief Administrator, Head of Operations and Budget Coordinator. Senior technical positions were only 50% staffed.

An FAO Report of May 2002 with Terms of Reference for the strengthening of the DOF states: "The Fisheries Department of Guyana is in a critical, emergency situation from a structural and operational point of view". It also highlighted levels of vacancy as indicated above. Some of the reasons cited were: the difficulties in finding suitably qualified candidates and the Government's inability to offer attractive remuneration packages to the few potential and qualified candidates. It raised doubts about the department's capability to undertake its regular functions and services, especially in the areas of licensing and the collection and inputting of data. The paucity of resources hampered its ability to monitor and enforce regulations. There are financial consequences of this situation as the DOF, with its limited manpower is unable to visit the field and enforce licensing as an example. It is estimated that only 25% of artisanal operators renew licenses annually. The absence of senior officers and/or Scientists in the DOF hinders the formulation of new policies and regulations and their enforcement. The Department is therefore unable to respond to the changing environment of the entire fisheries sector. Various reports have shown specific areas of over exploitation and other detrimental practices and the DOF was unable to respond. One specific example is the large number of trawling vessels licensed post 1996, despite pre determined limitations.

See Annex for chart highlighting the positions and vacancies.

Fisheries Advisory Committee

This committee which was active during the late 1990s is currently non-functioning, mostly due to the absence of the Chief Fisheries Officer. If re-commissioned, this committee can provide direct linkages between Government, industry leaders and the artisanal operators. There is enough information in the institutional memory of the DOF and Ministry of Agriculture to ensure that selection criteria are reviewed to make future committees more effective.

III Economic Profile

Gross Domestic Product (1988 Prices)-G\$ Million

ITEM	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003*
G D P	4450	4676	5048.	5360.	5270.	5426.	5352.	5474.	5536.	5501.
Agriculture	1302	1412	1493.	1577.	1475.	1670.	1519.	1571.	1625.	1607.
%of GDP	29.3	30.2	29.6	29.4	28.0	30.8	28.4	28.7	29.4	29.2
Fishing	120.0	132.0	135.0	146.0	142.0	143.0	164.0	165.0	159.0	159.0
%of GDP	2.7	2.8	2.7	2.7	2.7	2.6	3.1	3.0	2.9	2.9
%of Agriculture	9.2	9.3	9.0	9.3	9.6	8.6	10.8	10.5	9.8	9.9

Source: Bank of Guyana Statistical Bulletin 2003

2003* - Estimates from Budget 2004 speech dated March 29, 2004

The various fisheries from an economic perspective, has its genesis with the commercialization of the prawns industry in the early 1960s. Prior to this finfish and whitebelly shrimp were captured by small artisanal village fishers. With the discovery of the rich shrimping grounds off the country's Atlantic Shelf, international fishing operations utilized Guyana to establish processing plants and headquarters for trawler fleets. Prawns were harvested, processed and exported. Unofficial reports indicated that factory/processing ships operated on the high seas. This fishery expanded rapidly into the mid 1970s. With the country's declaration of its 200-miles Exclusive Economic Zone in 1977 the fishery was converted to a national fishery.

Finfish by-catch, and the commercialization and export of seabob 20 years later have considerable economic and employment impact on the country. In the immediate past five years fisheries contribution to economic indicators has risen considerably, especially in the significant role it has played as a foreign exchange earner. In the last two years it has overtaken rice exports.

In addition to providing employment, the sector also has other social benefits. Country and international statistics state that local consumption of seafood is increasing, with estimates ranging close to 60 kilograms per person, per annum. This is very high compared to global and South American averages, with Guyana's consumption being 200% to 300% as much. Consumption is determined by a broad computation which assumes that the net difference between *reported* fisheries production and *reported* fisheries export is consumed locally. The formula needs to be modified for Guyana.

The seafood processing companies provide among its various statistics, employment information. The smaller, private and mostly single owner/manager type operations, entrepreneurial by nature, do not focus on record keeping and do not normally provide statistics to the Department of Fisheries. Many of the micro type operations are in operation to provide a subsidized form of income and source of protein for

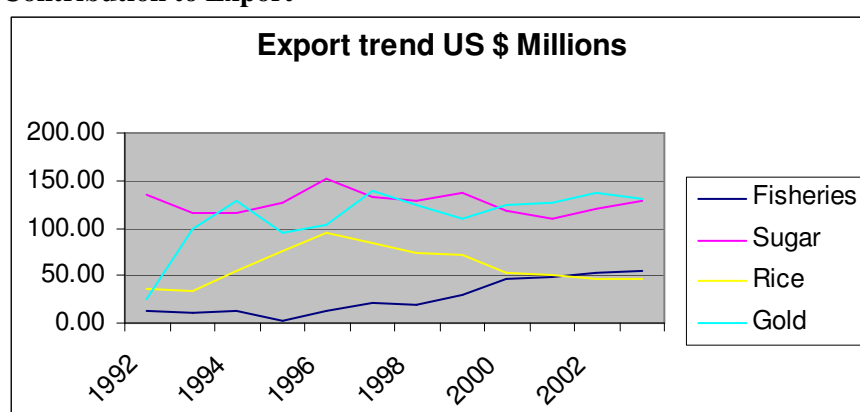
the family. It is estimated that the fisheries sector provides direct and indirect employment on a permanent or part-time basis for approximately 13,000 (+/- 10%).

In the last decade the agricultural sector has contributed an average of 29.3% to the country's GDP. The Fisheries sector contribution averaged 9.6% annually.

Information relating to the economic and employment ripple effects of the sector is unavailable. The fisheries sector, especially seabob fishery has expanded considerably since 1996. There was some conversion of fishing effort (vessels and gear) from prawns to seabob, but a number of processing plants were started during this period. Information on the level and source of these investments are unavailable.

The significance of fisheries as a contributor to the GDP and foreign exchange and its potential is now being recognized.

Contribution to Export



Source: Bank of Guyana – Statistical Bulletin Dec. 2003

Statistics for exports by sector are produced by the Bank of Guyana on information provided by the Bureau of Statistics, which uses as its source, information from Guyana Revenue Customs and the Department of Fisheries. Domestic exports using f.o.b. values have grown since 1992 by 39% from US\$363 million to US\$506 million in 2003. There are no adjustments in export prices for each commodity. Of the four major contributors to exports the fisheries sector has shown the most growth. While rice has declined consistently since 1996 and sugar produced at a relatively constant level, fisheries exports have progressed from US\$13 million in 1992, increased by approximately 300% to end 2003 at US\$54 million.

The foreign exchange earning capacity of this sector has replaced rice to rank third in December 2003.

Industry Borrowing

The Bank of Guyana statistics provide information on the fisheries as a sub-sector of agriculture. A review of the relationship between borrowing and export provides an insight into the manner in which the growth of the sector has been financed. Over a ten-year period (1994-2003) exports as one indicator of production levels, increased by 482%, from G\$1.8 billion to G\$10.5 billion. Borrowing from the commercial banks increased by 350% from G\$209 million to G\$950 million. It must be noted however that there is no available information on non-commercial bank borrowings, foreign bank borrowings or stakeholders' investments.

As a comparison, over the past five years the rice sector's average annual export was G\$9.6 billion and borrowing averaged G\$9.8 billion over the same period. In the absence of official data, the results of interviews suggest that most of the major capital expenditures were for the construction of processing plants, wharfing facilities, ice making and other ancillary services. Post 1996, while some trawlers changed ownership and large industrial vessels were constructed locally, the financing for these was a relatively minor portion of the sector's total debts.

Production Analysis

Fisheries production is generally categorized by two methods. Firstly, the identity of the harvester determines whether the enterprise is classified as an Industrial or Artisanal operator. An Industrial operator is loosely defined as predominantly trawling and shrimping vessels and those vessels or operations that are attached to, or are an integral part of a larger processing enterprise. Included in this group are privately owned vessels which sell to the processing plants. The Artisanal group is made up of the smaller enterprises and village fishers who operate close to the shore, generally utilizing smaller, mostly wooden boats and seines or cadell lines.

The second category classifies the operator by product catch. Technical data captured by MOF subdivides all production into Prawns, Shrimp and Fish Fisheries. Shrimp fishery includes Seabobs, the production of which in recent times dominates this category. General economic data combines prawns with shrimp. At international and country levels, these sub divisions are all combined and recorded as the country's 'fisheries' production. Historically, prawns and fish were the main catch until 1996. Shrimp production was mostly artisanal, using seines and nets and yielded mostly a variety of smaller shrimp and the larger seabobs. The industrialization of seabob harvesting was pioneered by Mr. Bruce Vieira of BEV Enterprises. Over the next two to three-year period as the harvest of seabobs increased and the prawns catch declined a number of trawlers were converted from prawns to seabobs operations. Prawns trawlers were re-outfitted with minimum modifications to trawl for Seabob.

Total Production Statistics

FISHERIES PRODUCTION (mt) 21YEARS									
YEAR	PRAWNS		Shrimp (& Seabob)		TOTAL		FISH		TOTAL Fish
	Whole	Tail	Ind	Art	Shrimp	Shrimp & Prawns	Ind	Art	
83	4,240	2,650	0	1,774	1,774	6,014	4,227	28,150	32,377
84	3,430	2,144	222	1,720	1,942	5,372	5,653	28,381	34,034
85	3,043	1,902	943	1,666	2,609	5,652	4,988	28,565	33,553
86	3,806	2,380	884	1,612	2,496	6,304	4,665	28,840	33,505
87	3,840	2,404	773	1,560	2,333	6,179	4,050	29,008	33,058
88	2,995	1,872	1,566	1,591	3,157	6,152	3,734	28,310	32,044
89	2,896	1,810	1,831	1,623	3,454	6,350	2,485	28,205	30,690
90	2,504	1,565	1,864	1,646	3,510	6,014	2,064	30,124	32,188
91	3,069	1,918	2,684	1,728	4,412	7,481	2,727	32,538	35,265
92	2,370	1,481	2,681	1,814	4,495	6,865	2,257	34,112	36,369
93	2,632	1,645	4,522	1,903	6,425	9,057	3,006	35,818	38,824
94	3,024	1,890	6,737	0	6,737	9,761	1,589	36,533	38,122
95	2,998	1,874	9,344	0	9,344	12,342	1,916	35,332	37,248
96	1,260	787	11,292	3,209	14,501	15,761	2,636	34,947	37,583
97	1,894	1,184	17,268	5,366	22,634	24,528	1,181	35,768	36,949
98	1,935	1,209	10,515	17,693	28,208	30,143	1,711	37,479	39,190
99	1,595	996	9,394	3,397	12,791	14,386	933	34,051	34,984
00	1,132	707	16,098	635	16,733	17,865	1,139	28,629	29,768
01	1,888	1,160	25,158	1,428	26,586	28,474	1,253	23,436	24,689
02	1,522	951	18,405	730	19,135	20,657	3,175	21,586	24,761
03	1,161	725	19,017	188	19,205	20,366	3,311	29,801	33,112

*Sources: - Department of Fisheries Statistics

-Fisheries Background Report – CIDA Project #440/16650 July 1994

Fisheries Production Analysis

The most significant changes in fisheries production over the past 20 years are the reduction in annual harvest of prawns and the growth of seabob harvesting post-1996. This is perhaps the most significant milestone in the industry's history. Hence this analysis examines the pre and post-1996 results. This differentiation is necessary as in addition to the changes in fisheries harvesting, resources and assets were re-allocated by the operators in the post-1996 period. During this transition period and as the industry evolved, the government's fishery assets were privatized and a significant number of new businesses entered the marketplace.

Prawns' yield showed a constant decline from 1983 to 1996 reaching a low of 787 metric tons, 70% less than in 1983. Prawns are recorded by tail weight at the dock sites as it is processed at sea and the heads discarded. The tail weight is used to calculate the whole weight using a factor of 62.5%. During this period industrial and artisanal shrimp production had grown by almost 500% to approximately 9,344 mt. While artisanal shrimp production remained constant, industrial shrimp production increased considerably starting in the post 1992 period, by small scale seabob harvesting.

The finfish industry by 1996 showed a very modest 15% growth as the artisanal production component increased by 25% and the industrial fish production component decreased by 55%. To explain the reason

for these trends we have to take into account that industrial fish production is made up predominantly of fish by-catch from the shrimping vessels.

1996 saw the start of a number of significant trends which continued to 2003. Prawns production in 1996 was 787 mt, the second lowest over 21 years. The fluctuation between high and low yields was in the 50% range but showed a constant decline. It would appear that prawns production in 1996 was an aberration and by the end of 2003 a catch of 725 mt was the lowest over the 21-year period.

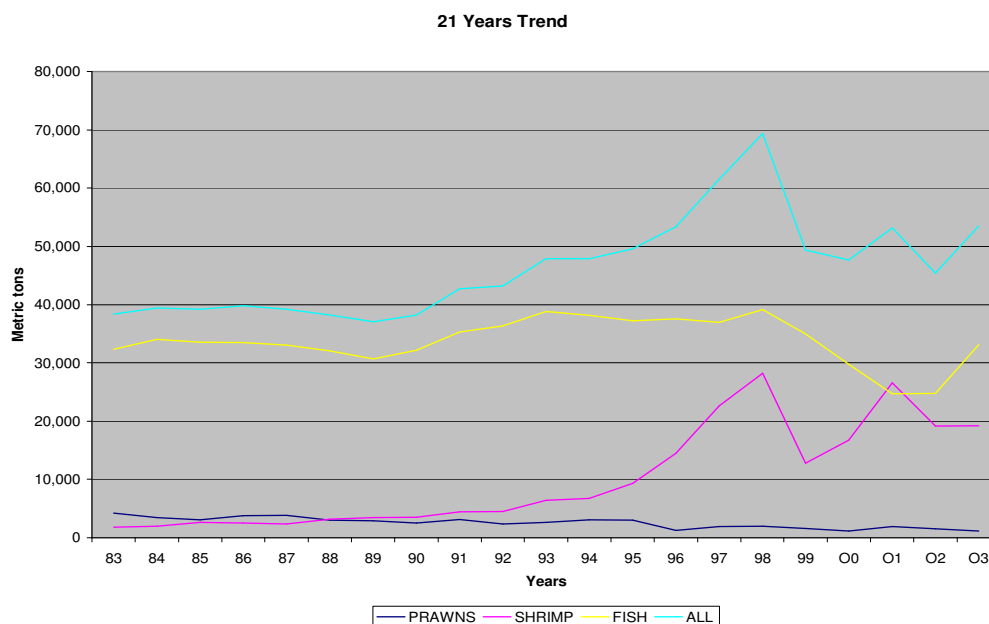
Seabobs production increased consistently reaching a maximum at 25,000 mt in 2001 and averaging approximately 20,000 mt over the last four years. Post 1996 artisanal shrimp production was very erratic and showed a constant decline to its lowest ever of 188 mt in 2003. Crustacean production as a group increased to a high of 30,000 mt in 1998 and seems to have settled at an average yield of 20,000 mt per annum.

Finfish production in 1996 was 37,583 mt, peaked at 39,000 mt in 1998 and appears to have declined to the 33,000 mt range by 2003. Interestingly, over the last 21 years the average finfish production remained constant. Prawns and artisanal shrimp have declined considerably, while the main growth has been the seabob sector.

Caution

Data generated by the DOF from the processing plants, industrial fleets and information from landing sites may not show the total production figures for all fisheries. Many smaller fishers operate on a cash basis with limited or no record keeping or reporting. Over-the-side sales, specifically for prawns and seabobs are neither reflected by the vessel owners nor the DOF. These purchases may be reflected in export figures, despite not being recorded as production data.

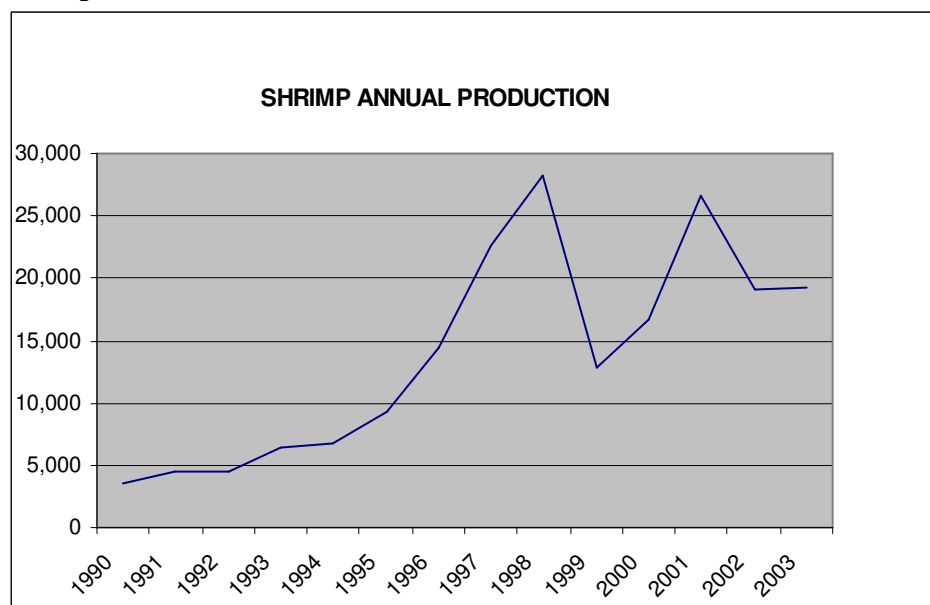
Total Fisheries Production



An analysis of the trends in total fisheries production shows the four major fisheries producing at a fairly constant rate during the period - 1983 to 1992. Over the next ten years the production of prawns declined considerably. Finfish and all shrimp, including seabobs, increased during the first half of the 1990s, with both reaching the highest level of production in 1998. Production then tapered off over the next two to three years with fish showing some recovery and total shrimp production hitting a plateau during the last two years.

Many reasons are attributed to these increases and decline, however, the most significant is the increase in seabobs production when the industrial fleets switched from prawns to seabobs harvesting. The overall decline as reported in various studies is attributed to over-fishing, general over-exploitation and poor harvesting practices. Some of the unusual and/or isolated fluctuations in annual production may be attributable to the direct and delayed ripple effects of the El Nino and La Nina weather patterns in the latter half of the 1990's. Total fish production, the aggregate of all fisheries, reached its maximum in 1998 but has declined since.

Shrimp Production



**Source: Ministry of Fisheries Production Statistics*

Total shrimp production is a combination of industrial and artisanal harvest. Industrial data is made up primarily of seabob production. Prior to the 1996 escalation in seabobs harvesting it was routinely harvested by both industrial and artisanal fleet and recorded as shrimp production. In the post 1996 period a significant change in recording occurred. Seabobs caught by the industrial vessels were recorded as such, artisanal catch were generally sold at the landing sites to agents of the processing plants, and recorded as industrial production.

Shrimp production has shown constant growth starting in 1994 with an acceleration in 1996 and thereafter. Maximum annual production was attained in 1998 when 28,208 mt were harvested. The second highest annual production was in 2001 when 26,586 mt were recorded. Since then in 2002 and 2003 production declined and is now averaging 19,000 mt per annum. In the absence of any scientific validation, various authorities are suggesting that production is now at a plateau with an anticipated decline for the future. The impact of over-the-side sales on these fluctuating results is unknown.

Industrial Shrimp Harvesting (Seabob)

Assessment of Seabob Resources (*Xiphopenaeus Kroyeri*)

There is no evidence of any scientific assessment of the seabob biomass off Guyana's Continental Shelf. A CIDA sponsored report, in July 1995, makes general reference to shrimp scientific assessment that was concluded prior to this date. Its focus was on prawns and fish. However, at that time seabobs were an 'unidentified' fishery entity and included as shrimps. There are also no records of seasonal, annual or any form of periodic sampling being conducted on the seabobs fishing grounds to determine the changes in size of adults, percentage of juveniles, migration patterns or seasonal behaviours. Some of the larger fish processing operations may have accumulated general data of this nature. This information is not shared nor is it available to government sources as it provides the basis for the deployment of vessels to the productive fishing areas.

There are concerns expressed by these processors and some of the boat captains interviewed that indicate the average size of the adults is decreasing and the stock itself seems to be declining annually. While seabob processors have noticed that the incidence of juveniles and broken shrimp are increasing, there is no specific scientific study to track this trend. The DOF conducts periodic sampling of seabob catch and have commented on their findings. The sizing of seabobs is expressed as the number of shrimp per pound. Seabob count of 100 per pound identifies the larger matured specimen. The DOF has reported that the production level of seabob harvesting is declining and also confirmed an increase in juveniles and damaged shrimp.

The DOF collects data by way of samples and/or reports from the food processors to examine the proportions between fully grown and less matured seabobs. An analysis of these records indicates a decline in larger seabob and an increase in smaller ones. The ratio between these is approximately 35% of catch is 90-110 per pound and 65% at 300-500 per pound. These are clear indicators that the rate of harvesting is not allowing the seabobs to become fully grown.

The major industrial seabob fish processors suggest that the harvesting of juveniles and broken shrimp is mostly a more common occurrence on the privately owned vessels which sell their catch to the processing plants. As an argument this could be one of the reasons for the declining trend, since shrimp not meeting processors' specifications are rejected and not recorded in the country's production.

Trawler captains have expressed concerns about traveling greater distances to reach the fishing grounds. These fishing locations are guarded secrets and some captains appear to deliberately misinform about these locations, to preserve these resources for their own future use. While these distances may be greater, there is some indication that the travel may be parallel to the coastline. As recently as April 2000 the Fish Code Management Workshop in Guyana recommended that "consideration be given to prohibit trawling for penaid shrimp from the 18 fathom isobath shoreward and establishing closed seasons." It also recommended that "the current level of 100 shrimp trawling vessels need to be reviewed urgently."

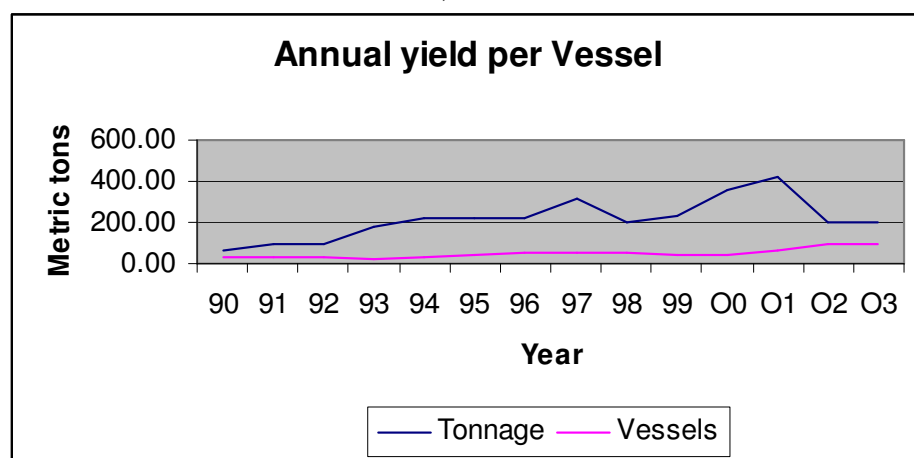
Interviews with some boat owners and trawler captains, both industrial and artisanal, indicate that the average time spent at sea over the past five years has increased by almost 50%. Five years ago, the average stay at sea was seven to ten days and yielded 30,000 lbs per trip. This now ranges between 10 to 14 days and the volume of the catch is down to an average of 25,000 lbs per trip, a decrease of 16%.

Seabob, the major growing fishery over the past ten years, is now showing signs of distress. Vessels are staying 50% longer at sea, returning with 16% less catch. There is a marked increase in the level of smaller seabobs in each catch. While this has been the high growth area for the sector, statistics also indicate that fishing effort (vessels and gear) have increased dramatically in the seabobs fishery. The

absence of any scientific or technical assessment of the state of the stocks or a correlation between effort and yield are of major concern.

Seabob Yield per Vessel

Year	Tonnage	Vessels	Shrimp
90	58.25	32	1,864
91	92.55	29	2,684
92	99.30	27	2,681
93	180.88	25	4,522
94	224.57	30	6,737
95	222.48	42	9,344
96	225.84	50	11,292
97	319.78	54	17,268
98	198.40	53	10,515
99	234.85	40	9,394
00	357.73	45	16,098
01	419.30	60	25,158
02	202.25	91	18,405
03	200.18	95	19,017



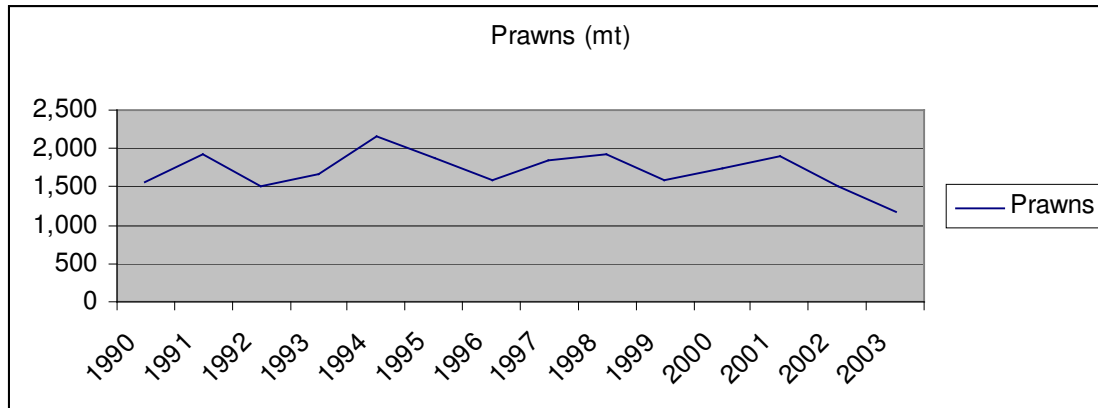
Seabobs Production by Vessel

Department of Fisheries Licensing Statistics indicate that there were 32 vessels in 1990 which were involved in harvesting larger shrimp. These were mostly the artisanal wooden type boats and this classification of license may have included vessels involved in other types of activities. After 1996 when seabob harvesting came to prominence, the distinction between seabob trawler license and prawns trawler license commenced. Post 1996 the number of seabob vessels gradually increased, more so in the last two years and is at its highest level of 95 at the end of 2003. However, catch per vessel was at its highest in 2001 at approximately 419 mt when fleet size was 60. The next two years fleet size increased by 50% but yield decreased by 50%, reducing per vessel production equal to pre-1996 levels.

Over the past ten years the average annual production per trawler was 238 mt per annum and appeared to be at a constant level despite significant increases in the registered number of harvesting vessels. The Fish Code Management Workshop of April 2000, in Guyana, reported that “fleet/plant owners had the policy of not harvesting more than 28,000 lbs per trip.” This level of harvesting is consistent with vessels capable of doing 18 to 20 trips per annum. It therefore indicates that the vessels are staying at sea until they have attained this level, even though the duration of the trip is increasing.

Prawns Production

Prawns Annual Production



The prawns industry has its genesis in the 1960s when the Georgetown Seafoods, located at Providence, EBD, commenced operations as a base for foreign owned vessels. During the earlier years and as late as 1989 there was an average of 100 licensed prawns trawlers. While there were reports of other vessels fishing in the country's EEZ during that time, there are no records or estimates of how many were harvesting prawns.

The Department of Fisheries records indicate that in 1983 prawns production was at its highest when 4,240 mt of whole prawns were harvested. Since then production has shown a steady decline and as at 2003, its lowest yield of 1,161 mt were harvested by 40 trawlers. While these figures are quoted as whole weight, the landed catch which consists of headless prawns is recorded by tail weight. A factor of 1:0.625 is used to calculate whole weight.

During the past ten years recording of prawns production and export by the Bureau of Statistics, Department of Fisheries and the Bank of Guyana, shifted back and forth between whole weight and tail weight and has caused some confusion in the recorded data. While the total volume of prawns has declined the DOF and some trawler captains confirm that prawns size has also declined. Over-the-side prawns sales are the highest for any of the fisheries. It is safe to assume that the larger, better quality prawns would be the target of this illegal activity. These sales escape recording by trawler owners and the DOF. It is believed that over-the-side sales are not recorded as prawns export sales.

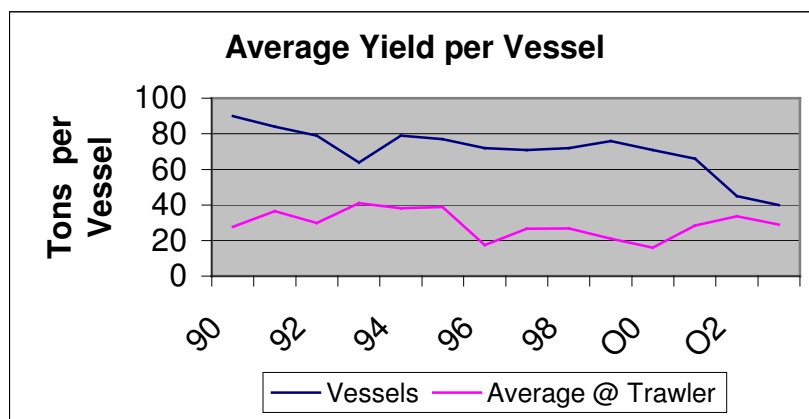
Undoubtedly, prawns resources appear to be on the decline, reflected not only by gross harvest weight, but by approximately 55% reduction in the number of trawlers operating off the Continental Shelf. Captains confirm that "there are only 2-3 good months for prawns off Guyana each year". They then travel greater distances to other fishing grounds.

PRAWNS- Yield per Vessel

Year	Vessels	Average @ Trawler	Annual Production
90	90	27.82	2,504
91	84	36.54	3,069
92	79	30.00	2,370
93	64	41.13	2,632
94	79	38.28	3,024
95	77	38.94	2,998
96	72	17.50	1,260
97	71	26.68	1,894
98	72	26.88	1,935
99	76	20.99	1,595
00	71	15.94	1,132
01	66	28.61	1,888
02	45	33.82	1,522
03	40	29.03	1,161

**Source: DOF Statistics*

Table reflects whole weight of prawns

Harvest trend of Prawns

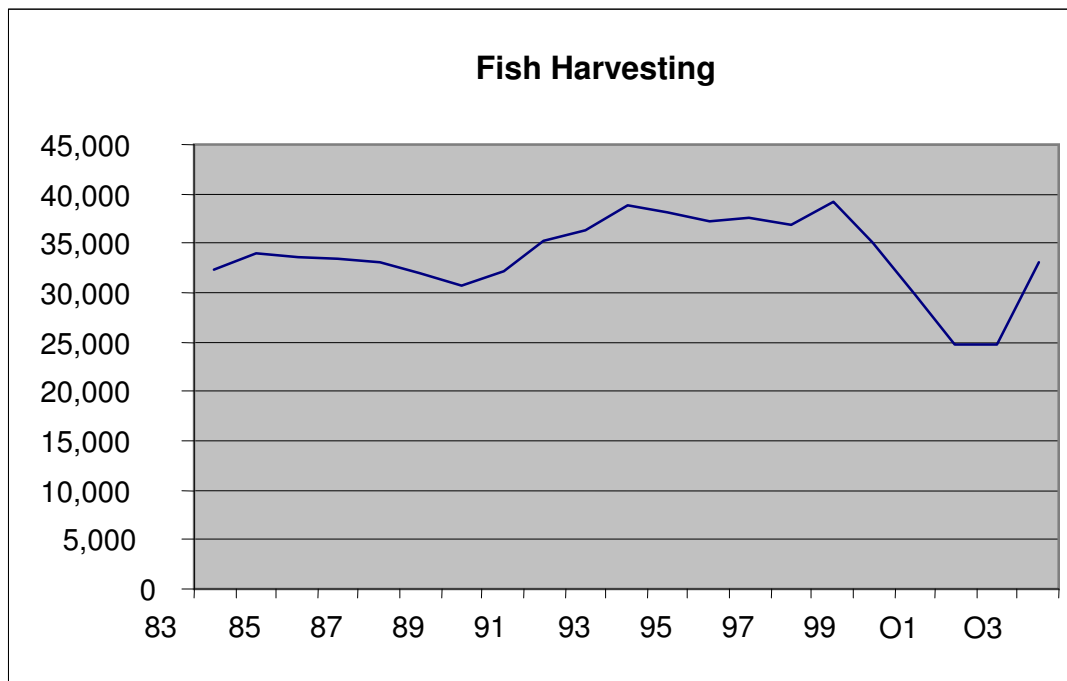
The average yield per vessel over the last 14 years is 29.44 mt, per annum. While yield has fluctuated from a high of 41 to a low of 16 mt per annum, annual production seems to be constant and these highs and lows have occurred sporadically. In the last three years average trawler production increased as the fleet size declined from 71 in 2000 to 41 in 2003. It appears that the trawler operators have successfully developed strategies for maximizing the production of each vessel. At the same time they have responded to the declining prawns resources by redeploying their trawlers to the more lucrative seabob fishery.

There are some indicators that these trawlers are staying longer at sea and the average size of prawn has declined considerably over the last ten years.

Rising Fuel Expenses

Trawler owners have expressed concern regarding significant increase in fuel expense per trip. The Association has conducted analyses of all trip expenses. The industry practice is to express fuel expenses as a ratio of all harvesting expenses. Fuel expenses are increasing more rapidly than other trip expenses. This is of primary importance as it is the major trip expense. This trend is substantiated by other trends on the high seas. Vessels are staying longer at sea and are traveling greater distances to get to shrimping grounds. Over-the-side sales are not included in trip production. The cost of diesel and gasoline fuel has increased significantly over the past two years. It seems therefore that not only is consumption per trip increasing, but the escalating cost of fuel further aggravates this situation.

Finfish Production



During the past 21 years total fish production has increased by 735 mt. It has fluctuated annually, increasing in 1983 to reach its highest level in 1998 of 39,190 mt, followed by a decline to 33,112 mt in 2003. Lowest production years were 2001 and 2002 when production averaged 24,700 mt each year.

Fish production was recorded as the combined data from industrial and artisanal fishers. Artisanal fishery production during this 21-year period increased by 1,651 mt. Industrial fishery production declined from 4,227 mt in 1983 to its lowest level of 933 mt in 1999 with recovery over the next four years to finish the period at 3,311 mt.

The DOF, as part of its data capture programme visits landing sites to record artisanal fishing production. Industrial fish production is reported to the DOF as by-catch, as supplementary information to their shrimp trawling reports. In the last ten years, the average artisanal fish production 31,756 mt per annum was 17 times as much as the industrial fleet average of 1,884 mt. Not all industrial production is by-catch. During the past five years a number of privately owned industrial vessels were involved in Red Snapper trap and hand line fishing. The captains of four industrial vessels (two trawlers and two privately owned wooden vessels) observed a general decline in the size and variety of finfish. Some of the rare and prized species that were available circa 1990 are seldom seen. While the prawns and seabobs industries showed significant changes in the post 1996 period, finfish production was unaffected.

There are no current scientific studies or exercises to determine the finfish biomass, nor are there any comments on the current level of exploitation. Some reports and the results of forums within the past five years have indicated that some fish stocks were being exploited at or above sustainable levels. The long-term sustainability of the *Macrodon ancylodon* (Bangamary) and *Nebris microps* (Butterfish) are under threat as these stocks have been over-exploited.

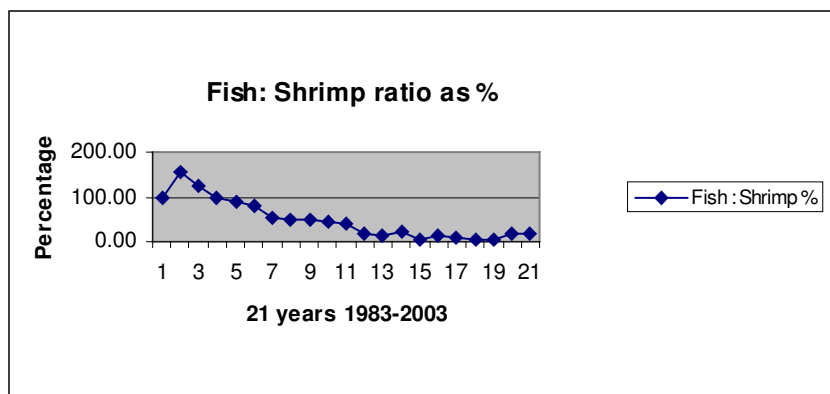
There are references to the existence of schools of deep sea pelagics in the furthestmost depths of the Guyana shelf. Various international reports in the libraries of the FAO and the CFU have alluded to this. Some hand liners have ventured into the area and there are reports of foreign vessels also fishing there. The potential of this area is relatively unknown and untapped by Guyana's fishing industry.

Fish By-Catch

Finfish to Shrimp Ratio

Ind. Shrimp & Prawns	Fish Industrial	Fish : Shrimp %
4,240	4227	99.69
3,652	5,653	154.79
3,986	4,988	125.14
4,690	4,665	99.47
4,613	4,050	87.80
4,561	3,734	81.87
4,727	2,485	52.57
4,368	2,064	47.25
5,753	2,727	47.40
5,051	2,257	44.68
7,154	3,006	42.02
9,761	1,589	16.28
12,342	1,916	15.52
12,552	2,636	21.00
19,162	1,181	6.16
12,450	1,711	13.74
10,989	933	8.49
17,230	1,139	6.61
27,046	1,253	4.63
19,927	3,175	15.93
20,178	3,311	16.41

*Source: Information extracted from DOF Statistics



Fish By- Catch Analysis

International regulations require shrimp trawling vessels to land a minimum, pre-determined amount of by-catch annually. These regulations have been established to control the dumping of unwanted or unprofitable species at sea. Shrimp is the main target and fish a by-catch in the nets. Trawlers maximize their effort by utilizing to a maximum their refrigeration and storage capacity at sea.

The preceding table shows the ratio between industrial shrimp and industrial fish production. This is expressed as a percentage and highlighted in the above graph. These statistics show that industrial fish harvest declined by 22% from 1983 to 2003, with its lowest level in 1999. Prawns and seabob production over the same period, increased by 375%. More recently in the last 10 years, average annual industrial fish production was only 1,884 mt. The ratio between fish and shrimp production declined constantly from a high of 155% in 1984 to an average of 12.5% in the last 10 years

Guyana's Fisheries regulations have established a by-catch limit of 32,000 lbs. (14.5 mt) per vessel, per annum. These regulations were introduced to control the prawns trawling industry. As stated earlier, in 1996 and thereafter, seabob fishing became industrialized and a number of prawns trawlers were converted for seabobs harvesting in 1996

It appears as if the by-catch limit has been met over the past 10 years. 124 trawlers harvested an average of 1,885 mt of fish per year. Applying current regulated limit of 14.5 mt per trawler, per annum, these conform to the regulations as they were required to land $124 \times 14.5 = 1,798$ mt annually. Actual production was 3,311 metric tons in 2003. However, during this same 10-year period, the shrimp trawlers averaged 29 mt per annum while the seabobs trawlers averaged 238 mt per annum or approximately eight times as much. Yet both groups conform to the 14.5 metric tons by-catch limit. The by-catch limit for seabob trawlers require investigation and assessment by the relevant authorities. Internationally many countries are utilizing the BEAM 4 calculation method to determine by-catch limits. This tool is specially designed for eco-systems where shrimp is the target and finfish the by-catch. **See Annex.**

Production as at March 2004

IV Inland Fishery

Inland fishery can be segmented into inland, salt (tidal water), sweet (fresh water), and ornamental fishery. Fishing occurs in rivers, lakes, canals, creeks and flood plains. In Guyana it is done by fisherpersons, mostly on a part-time basis for sale and/or family subsistence. It is seasonal and occurs mostly in the off-season of the sugar and rice industries.

Interviews were conducted with four fishermen in the Eccles to Herstelling corridor on the East Bank of the Demerara River. Two are full-time river fishers using pin seines, Chinese seines and cadell lines. The other two subsidize family income by fishing with casting nets in the canals. They all have more than twelve years fishing experience. They unanimously state that volumes have constantly declined over the past ten years. The size of the catch is diminishing and some species are seldom seen. In the Demerara River bangamary, shrimp, and some types of catfish are greatly reduced. Other types of catfish are abundant among the outflow from the fish processing plants in the area. In the inland waters, the snook, mullet, sunfish and many others seem to be disappearing, while the size of the hassar, patwa and houri are decreasing. It is unknown whether this is the result of marine traffic, industrial and domestic outflows into the water system, or the effects of net fishing on juveniles.

There are increased employment opportunities and accessibility to other forms of protein, e.g., supermarkets, chicken, for non-urban residents. Inland fishing as a source of employment or as a food source has diminished. The number of micro-fishers have also decreased. The volume and size of inland fisheries catch is decreasing.

Aquaculture

The FAO of the United Nations has a number of publications and research documents which have forecasted that “farm cultured” seafood would provide economic and social benefits to developing countries in the future. Some analyses indicate that it is one of the fastest growing fisheries industry and the production from third world Asian and Far Eastern countries are noticeable on world food supply and commodity markets.

The Government of Guyana embarked on an Aquaculture development program in 2001. The Mon Repos Freshwater Aquaculture Demonstration Farm and Training Centre was constructed by means of collaboration among the Government of Guyana, the Food and Agriculture Organization of the United Nations (FAO) and the Canadian International Development Agency (CIDA). The Training Centre was constructed to provide information on site selection, pond preparation and farm management. The Centre is also involved in the production of fingerlings of various species and conducts trials on feeding, growth rates and other parameters regarding species with aquaculture potential. The objectives of the Mon Repos facility are to:

- Provide training to farmers to enable them to practice scientific sustainable aquaculture;
- Provide high quality seed stock and brood stock to farmers to enable them to attain high yields; and
- Perform adaptive research and provide the information to farmers so as to improve the productivity of the sector.

The Mon Repos Fresh Water Aquaculture Farm is currently involved in developing the technology, stock and spawn, for fresh water aquaculture in Guyana. The farm has been in existence for three years and it is researching various species of Tilapia, Hassar, fresh water Prawns and Pacu. In the brackish water culture in the Corentyne, Berbice and Essequibo areas, a number of small, recently started, aquaculture businesses have graduated from research to the early developmental stages.

V Strengths, Weaknesses, Opportunities and Threats- SWOT Analysis

Strengths

- The experience, information and institutional memory of the current fishery operators
- The ability of the various fisheries to recover and regenerate
- Vibrant private sector

Weaknesses

- Vacancies at the Department of Fisheries
- Lack of recent scientific analysis
- Out dated Regulations
- Inability to enforce regulations

Opportunities

- Foreign exchange earnings from sale of fish and marine products
- Increased revenues for GOG
- Expanded employment from sectoral growth
- Exploitation of deep sea pelagics
- Re-licensing and retooling of trawl fleet for deep sea finfish exploitation
- Increasing export levels through value adding
- Nutritional self-sufficiency from seafood as a source of protein.
- Road to Brazil – oceanic seafood export to South America
- Fresh-frozen seafood export by air

Threats

- Declining fisheries biomass and over exploitation of species
- Competition for shrimp production from developed aquaculture societies
- Production cost of cultured shrimp lower than traditional harvesting
- Chinese seines and fish traps
- Nomadic trawling - harvesting of any type of fisheries by trawlers
- Increasing fuel consumption/high fuel prices

Entry Barriers

- Industrial fleet oversubscribed
- Capital intensive industry which is highly competitive with diminishing returns on investments

Exit Barriers

- High level of employment in rural area
- Government must be cognizant of high level of employment attributed to this industry, specifically in low income rural areas - approximately 13,000 employed
- High level of capitalization, plants, vessels, equipment

State of the Fisheries Stock

As early as July 1994 there were indications that fisheries resources were on a decline. A Fisheries Background Report prepared by CIDA in 1994 for the Department of Fisheries and Agriculture and conducted by a diverse group of Fisheries personnel, indicated as follows:

“Shrimp landings by the industrial trawler fleet have been in decline in recent years, and some rationalization of the fleet has occurred as a result. With the surge in demand for finfish products, however, there is concern that important artisanal stocks are being exploited at or near their maximum sustainable yield levels.”

In April 2000, the FAO of the United Nations conducted a workshop in Guyana to undertake stock assessments of the main commercial species of shrimp and groundfish in the Brazil/Guyana shelf. It was lead by Mr. Bissessar Chakalall, Regional Fisheries Officer, FAO Barbados; Terrence Phillips, CFRAMP – Shrimp and Groundfish, Trinidad & Tobago; and Juan Carlos Seigo, FAO Consultant, Mexico. Groundfish assessment citing various research surveys over the years, indicated that some fish stocks

were being exploited at or above sustainable levels. Stock assessments of Bangamary and Butterfish stated that the long-term sustainability of these stocks were under threat. Production statistics also showed that annual shrimp production had been falling. Assessments indicated that there was full exploitation of the Southern Pink Shrimp (*Penaeus Notialis*), the southern brown shrimp (*Penaeus Subtilis*), and over exploitation of the redspotted shrimp, (*Penaeus Brazileinsis*). Aquaculture was identified with the potential to increase the country's fisheries production. Seabob trawlers were staying longer at sea and the average size of this small crustacean appears to be declining. The majority of the size caught was 300 to 500 per pound

Caricom Fisheries Unit, in June 2001, prepared a Status Report and Recommendations for Management of the Shrimp and Groundfish Fisheries of Guyana. Fishing operators and stakeholders had expressed concerns regarding the decline in fish and shrimp landings in the Guyana/Brazil shelf. The CFU reviewed the state of the resources for the period 1995 to 2001 that was conducted by CFRAMP and FAO, in collaboration with the Departments of Fisheries in the countries. Penaeid shrimp tails showed a 36% reduction by volume over a ten-year period. Shrimp stock assessment results suggested that the decrease in landings were due to a steady decline in the abundance of the three main species of shrimp exploited by the Guyanese fleets. The status of exploitation of the stocks indicate that brown and pink shrimp are fully utilized at the present time, while similar assessments of pink-spotted shrimp indicate that this species has been over-exploited.

An analysis of groundfish fisheries expressed some concerns as to the harvesting and levels of certain species such as Bangamary, Butterfish, Grey Snapper and Gillbacker. Special emphasis was placed on the Bangamary, especially regarding the capturing of juvenile Groundfish by Chinese seine gear. In May 2002 an FAO Mission to Guyana, prepared a report entitled Programme for the Organizational and Operational Strengthening of the Department of Fisheries of Guyana. As part of the analysis of the DOF, issues and concerns related to the fisheries resources were included. It states that stakeholders who are involved in the harvesting and processing of fish and shrimp confirm a declining trend in the sector. They confirmed there was a decline in landings in both shrimp and fish over the last two years (2001, 2002).

Small-scale/artisanal and industrial fisheries operators also expressed concerns about the current state of regulation and enforcement. Their concerns were as follows:

- The decline in catches of the marine commercial species of shrimp and fish
- Reports of illegal, unregulated and unreported fishing
- A weak Fisheries Department;
- Lack of interaction with and feedback from the Government (Fisheries Department) on key issues; and
- The general tendency for person(s) to take advantage of any weak administrative and management system for their personal gain.

CARICOM (CRFM), EU (ICRAFD Project) conducted for Guyana and Suriname, a workshop on Groundfish Resource Assessment in November 2003.

The preliminary results relating to Guyana are as follows:

- **Seabob** – “Unless immediate action is taken this fishery is likely to collapse. The effort (vessels) in this industry is three times that which was registered, thus a cap should be placed on the number of vessels in the fishery, with an eye to reducing same.”
- **Trout and Bangamary** – “These two groundfish species showed that they were fully exploited by gillnets and trawl fishery. The artisanal gillnet is an opened access fishery and measures should be taken to restrict the effort in this fishery.”

- **Red Snapper** – “the Deep/slope fishery for southern re snapper was assessed and the initial results show that the fishery is under exploited. However, only one gear type was used in the assessment and further analysis needs to be done for a complete picture of this fishery so it would be unwise to add any new vessels to the fishery at this time.”

The Department of Fisheries conducts periodic assessments of the volume and size of the catch from each fishery. Records indicate considerable decline in yield for effort by volume and a decline in the size of crustacean stock.

The heads of some of the artisanal fishing cooperative societies and the captains of eight industrial vessels unanimously expressed concerns regarding the size of decline of the shrimp and fish stock over the past ten years. Fishing effort relating to equipment and level of activity has increased significantly, while the volume of catch is on the decline. These comments are not corroborated by any statistics in view of the lack of reports and records for this category of fishers. Seafood processors expressed general comments reflective of this trend.

Analyses in this report shows a general decline in the total harvest for the various fisheries on the Guyana Continental Shelf. The preceding graphs and tables show the decline in the total annual prawns catch. Seabob underwent a transition from artisanal fishing to industrial fishing with substantial growth in production. Within the last two years however, this appears to be on the decline. First quarter 2004 production data is showing a 48% decline in shrimp from the same period last year.

Finfish catch statistics are generally provided by the industrial sector and more so the larger operators. A significant, yet unknown amount of finfish captured by the artisanal sector is sold at local landing sites and therefore do not form part of any statistics. Some of the medium size operators, during interviews, expressed reluctance to provide any information and/or records to any official bodies, in view of the cash nature of these businesses.

Over-the-side sale of higher-priced fisheries appears to be a common occurrence on the high seas. Seafood processors and the owners of vessels unanimously voiced this concern while some sea captains confidentially confirm this occurrence. Estimates for this loss to the owners, range from 15% to 20%. While this is illegal, it appears to be a common and accepted practice. The destination of these sales, local or foreign, are not part of the country's statistics, hence if this amount is factored into the assessment of the fisheries resources, it would further aggravate the assessment of their depletion.

There are numerous and persistent reports of foreign vessels operating in the furthestmost parts of the shelf. Statistics on their capture of deep sea pelagics also escape the country's assessment of this fisheries stock.

VI Recommendations

The Department of Fisheries provided an analysis and recommendations on the status and sustainability of Guyana's fisheries.

Fisheries Sector

- Declining fish and shrimp stocks or stocks that have reached maximum sustainable levels need to be protected through sustainable management of the entire fisheries. There are a number of analyses of production data and reports from 1994 to date confirming these concerns. Scientific assessments of the biomass and sustainability of the harvested species is urgently required. The results of these assessments must be tempered with the economic and employment characteristics of each fishery stock prior to any significant decision making.
- Areas of demarcation need to be done so that conflict would not arise from the various gear types using the common EEZ. There are several reports of vessels trawling inward of the 36 metre (18 fathoms) fishing ground. The seabob trawlers involved in these activities increase the mortality of juveniles of the fish species. This area should be reserved for artisanal fishery.
- A detailed assessment of the impact of Chinese Seine Gear is required. It is one of the most destructive gears in the fishery. This gear destroys the juvenile of all species that are of commercial and ecological importance. It is very harmful to the marine food cycle. This gear is utilized mostly by the smaller artisanal fishermen who typically harvest Whitebelly shrimp and Bangamary. Consideration must be given to the approximately 400 registered operators in this sub-sector.
- The Artisanal Fishery in Guyana is currently an open access fishery. In order to protect this industry drastic changes are required since the stocks are declining. Regulations should be put in place to limit the number of fishers/vessels
- All boat operators need to be registered and licensed. Presently only boat owners are registered and are unaware of activities at sea. Accountability for activities and breach of regulations at sea then become the captains' responsibility.
- Fish Trap permits should be capped, regulated and phased out. This type of gear is very destructive to juveniles of all species. MOF estimates that 20% of the catch from fish traps are juveniles and may range up to 35% at certain times of the year.
- Hand line fishing regulations should enforce the minimum size of fish hooks to prevent capture of juveniles.
- Fish net mesh size need to be regulated. The minimum net size needs to be regulated to protect against the capture of juveniles.
- The type and the mesh size of nets, especially of the seines need to be regulated and enforced.
- Chinese, Floating and Circle Seines are very harmful to juveniles of all species. This should be a serious consideration in any scientific study as this type of gear operates in the delicate nursery areas of the Continental Slope.

Industrial Fishery

- A scientific assessment is required to assess the biomass of the shrimp fisheries resources.
- Shrimp fishery fleet needs to be capped and reduced over a period of time.
- The Seabob trawler fleet which should have been capped at 40 now stands at 95 registered vessels.
- The prawns fleet should be capped and reduced in response to the findings of scientific assessment. Over exploitation has reduced the fleet from 100 vessels to 40, however, approximately 8 to 12 harvest seabobs exclusively, even though licensed for prawns.
- Over capacity of shrimp fishery effort requires regulations. The industry has self-regulated and closes for six weeks each year. The effect of this practice on shrimp fishery is questionable since at opening of the season, all vessels rush to the grounds and commence harvesting whatever shrimp is available. Some attention must be given to staggering the release of vessels to the grounds, as well as the duration and frequency of the closed season.
- Harvesting of deep sea fishery needs to be encouraged. Regulations and incentives should be introduced to redirect excess shrimping effort into the harvesting of large deep sea pelagics.

Monitoring and Regulating the Cottage Industry

Monitoring and regulating of the Cottage Industry is required. There are about 15 small processors of fish and fishery products. Regulations must address the quality of products and sanitary conditions under which the processors operate. Inferior quality exports will reflect poorly on the entire fishery.

Guyana's Coast Line is 270miles/432 km long and there are approximately 100 landing sites. Only about 25% of these are visited monthly. There may be a need to employ fisheries officers in the various regions to assist in the monitoring of the landing sites.

Department of Fisheries

The Department of Fisheries is in dire need of additional human resources to accomplish its mandate. It urgently requires scientific, operational and enforcement personnel. Over the past ten years the 45% vacancy rate at the senior level is one of the main reasons for the status of the fisheries sector today. Revenue loss is also as a result of this situation. The survival of the fisheries sector in any country is relative to the quality and effectiveness of the monitors, regulators and enforcers. The DOF require urgent re-staffing and access to more complementing resources. Attention must be given to increase its role and resources commensurate with the sector's growth, levels of concern and the economic importance to the Country.

ANNEXES

Gear Types

Pin Seines or beach seines

Pin seines or beach seines are 2m high and could be up to 2,000 m long, with stretched mesh size of up to 9 cm. The net is placed at high tide in the inter-tidal zone and trapped fish are caught from the mudflats using smaller boats. The catch could include Mullet, Snook, Bangamary, Croaker, Queriman and Catfish.

Chinese seines

Chinese seines measure 16 m long, 4-6 m wide at the mouth and are funnel shaped. The mesh size reduces gradually from 8 cm at the mouth to 1 cm at the funnel. The net is attached to poles and placed on mud banks, mainly in the river mouth, then tidal currents pushes the fish and shrimp into the seines. The catch could include Seabob, Bangamary, Catfish, Butterfish and White Belly Shrimp.

Hand Line

Boats of up to 18 m in length “hand line” for Grouper and Snapper along the edge of the Continental Shelf. The boats normally carry eight polyethylene hand-lines carrying 16 hooks each.

Cadell Lines

These are demersal longlines which consist of a ground line anchored at each end and a series of approximately 80 lines dangling and set with baited hooks at 2 m intervals. The catch includes mainly Gillbacker, Catfish, Sharks and Cuirass.

Circle seine

This circle seine is a modified nylon gillnet and used in the Corentyne River.

Nylon gillnets

These are about 300m long with 8 cm size mesh and are used near the shore to catch mainly catfishes.

Polyethylene gillnets

These gillnets, ranging in length from 1,000 to 1,600 meters, are 4 meters deep and have a 20 cm stretched mesh size. These nets are set and hauled manually from boats. The catch includes Cuffum, Gillbaker, Mackerel, Gray Snapper, Trout and Sharks.

Export by Species - 2003

Total Weights and Value Export Data for 2003 (Jan – Dec)

Item	2003	
	Weight (MT)	Value (G\$)
Prawns	517.5	1,322,567,987
Seabob/Whitebelly	11,534.12	5,850,070,541
Shrimp Dried	18.92	16,095,875
Fish Frozen	6,992.5	2,417,052,246
Fish Fresh	291.08	100,104,954
Fish Salted	18.73	4,915,087
Fish Meat Frozen		
Fish Smoked	5.82	2,516,392
Fish Fillets	355.63	268,294,706
Fish Dried	354.27	109,287,774
Fish Eggs	12.79	598,814
Fish Glue	102.09	239,529,415
Snapper & Shark Frozen	1,473.58	595,135,063
Shark Salted	134.56	51,838,903
Shark Fin	45.72	230,063,291
Shark Bones		
Crab Meat Crab Back	15.13	8,377,428
Live Crab	15.88	7,739,116
Squid	1.16	805,810
Lobster		
Snail	0.13	26,060
Ornamental Fish	11.66	2,438,607
Total	21,901.27	\$ 11,227,458,069

Note: the weights and values received from customs & excise are not the actual exported weights and values in many cases due to the computerized system in place.

*Source: FAO Website

Fish Processing Facilities 2003

Categories	Plant Name	Processing Activities
Industrial Processing	BEV Processors	Fish & Shrimp
	Georgetown Seafoods & Trading Company Limited	Fish & Shrimp
	Noble House Seafoods	Fish & Shrimp
	Pritipaul Singh Investment	Fish & Shrimp
	BM Enterprise	Fish & Shrimp
	Guyana Quality Seafoods	Fish & Shrimp
	Royal Caribbean Inc.	Fish
	P.B.S. Investment	Fish & Shrimp
Small Plant Processing	Tropical Products	Fish & Shrimp
	Coldigen Commodities	Fish & Seabob
	R & S Enterprise	Fish & Seabob
	Star Seafoods	Fish
	International Fishing Investment Ltd	Fish & Shrimp
	Single Seafoods Export	Fish & Shrimp
	Caribbean Seafoods Inc.	Fish
	Floss fishing Investment	Fish & Seabob
	H. Sukdeo & Sons	Fish & Seabob
	El Jays Associate Ltd.	Fish & Shrimp
Cottage Industry Processing	Jashri & Sons Ent.	Dried Shrimp
	Kampta P. Seepersaud	Salted Fish & Glue, Fins
		Dried
	Data & Sons	Crab Meat
	Rajpattie & Sons	Dried Shrimp
	M.Z. Alli	Dried Shrimp
	Hansraj	Crab Meat
	A. A. Shakoar	Salted Fish & Glue, Fins
Storage Facilities		Dried
	B.S. Bacchus	Frozen Fish
	Belevas Enterprise	Frozen Fish
	N. Dos Ramos	Frozen Fish
	Bhagwandin	Frozen Fish
	Dwarka Chunilall	Frozen Fish

Guideline for Developing Fisheries Code of Conduct

FAO Fisheries dept code of conduct 1995

8.5 Fishing gear selectivity

8.5.1 States should require that fishing gear, methods and practices, to the extent practicable, are sufficiently selective so as to minimize waste, discards, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species and that the intent of related regulations is not circumvented by technical devices. In this regard, fishers should cooperate in the development of selective fishing gear and methods. States should ensure that information on new developments and requirements is made available to all fishers.

8.5.2 In order to improve selectivity, States should, when drawing up their laws and regulations, take into account the range of selective fishing gear, methods and strategies available to the industry.

8.5.3 States and relevant institutions should collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies.

8.5.4 International cooperation should be encouraged with respect to research programmes for fishing gear selectivity, and fishing methods and strategies, dissemination of the results of such research programmes and the transfer of technology.

Definitions

Demersal:

□ living in close relation with the bottom and depending on it. Example: Cods, Groupers and lobsters are demersal resources. The term “demersal fish” usually refers to the living mode of the adult.

Pelagic fish:

□ Fish that spend most of their life swimming in the water column with little contact with or dependency on the bottom. Usually refers to the adult stage of a species

Clupeid fish - any of numerous soft-finned schooling food fishes of shallow waters of northern seas

Carangidae

family Carangidae - large family of narrow-bodied marine food fishes with widely forked tails; chiefly of warm seas

fish family - any of various families of fish

order Perciformes, order Percomorphi, Perciformes, Percomorphi - one of the largest natural groups of fishes of both marine and fresh water: true perches; basses; tuna

carangid, carangid fish - a percoid fish of the family Carangidae

Peneidae - tropical prawns

family Peneidae

arthropod family - any of the arthropods

Natantia, suborder Natantia - shrimp; prawns; etc.

genus Peneus, Peneus - type genus of the family Peneidae

Crustacea - class of mandibulate arthropods including: lobsters; crabs; shrimps; woodlice; barnacles; decapods; water fleas

class Crustacea

crustacean - any mainly aquatic arthropod usually having a segmented body and chitinous exoskeleton

grunt - medium-sized tropical marine food fishes that utter a grunting sound when caught

percoid, percoid fish, percoidean - any of numerous spiny-finned fishes of the order Perciformes

family Haemulidae, Haemulidae - grunts

Haemulon album, margate - red-mouthed grunt found from Florida to Brazil

Sciaenidae- warm-water marine fishes including the drums , grunts, croakers sea trout

fish family - any of various families of fish

order Perciformes, order Percomorphi, Perciformes, Percomorphi - one of the largest natural groups of fishes of both marine and fresh water: true perches; basses; tuna

sciaenid, sciaenid fish - widely distributed family of carnivorous percoid fishes having a large air bladder used to produce sound

Department of Fisheries – Position Vacancies

Categories	Position	# of Positions	Sub-programme	Filled	Vacant
Administrative	Chief Fisheries Officer	1	Pro. Admin.	0	1
	Principal Fisheries Officer	1	“ “	0	1
	Admin. Assistant	1	“ “	0	1
Senior Technical	Senior Fisheries Officer	2	Res. & Dev.	0	2
		1	Legal & Insp.	0	1
		1	Res. & Dev.	0	1
	Master Fisherman	1	Aquaculture	1	0
	Limnologist/Hydrochemist	3	Res. & Dev.	5	0
	Fisheries Officer		Extension	0	1
			Legal & Insp.	0	1
Other Technical	Fisheries Assistant	7	Extension	3	0
			Res. & Dev.	1	2
			Legal & Insp.	1	0
			-do-	5	0
	TED Inspectors				
Semi-skilled	Fisheries Field Assistant	9	Legal & Insp.	0	2
			Res. & Dev.		
				0	6
	Fisheries Inspector	4	Aquaculture	1	0
			Legal /Insp.		
			Res. & Dev.	1	3
	Data Collector	2	Extension		
	Fish Station Attendant	3	Aquaculture	3	0
	Drivers	3	Pro. Admin.	3	0
	Cleaner	2	Pro. Admin.	2	0
Contracted	Driver	2	Pro. Admin	2	0
	TED Inspector	5		5	0

Total Shrimp Production - Seabob

TOTAL SHRIMP PRODUCTION		
Combined Industrial & Artisanal shrimp production		
YEAR	Industrial	Total Shrimp
83	0	1,774
84	222	1,942
85	943	2,609
86	884	2,496
87	773	2,333
88	1,566	3,157
89	1,831	3,454
90	1,864	3,510
91	2,684	4,412
92	2,681	4,495
93	4,522	6,425
94	6,737	6,737
95	9,344	9,344
96	11,292	14,501
97	17,268	22,634
98	10,515	28,208
99	9,394	12,791
00	16,098	16,733
01	25,158	26,586
02	18,405	19,135
03	19,017	19,205

Harvest by Vessel- Annual

HARVEST BY VESSEL

YEAR	Prawns Trawlers	Whole Prawns	Prawns mt @ Vessel	Seabob Trawlers	Seabob & Shrimp	Shrimp mt @ Vessel	Total Trawlers	Total Prawns & Shrimp	Total @ Vessel
83	149	4,240	28.46	0	0	#DIV/0!	149	6,014	40.36
84	134	3,430	25.60	0	222	#DIV/0!	134	5,372	40.09
85	133	3,043	22.88	0	943	#DIV/0!	133	5,652	42.50
86	128	3,806	29.73	0	884	#DIV/0!	128	6,304	49.25
87	129	3,840	29.77	0	773	#DIV/0!	129	6,179	47.90
88	100	2,995	29.95	19	1,566	82.42	119	6,152	51.70
89	94	2,896	30.81	24	1,831	76.29	118	6,350	53.81
90	90	2,504	27.82	32	1,864	58.25	122	6,014	49.30
91	84	3,069	36.54	29	2,684	92.55	113	7,481	66.20
92	79	2,370	30.00	27	2,681	99.30	106	6,865	64.76
93	64	2,632	41.13	25	4,522	180.88	89	9,057	101.76
94	79	3,024	38.28	30	6,737	224.57	109	9,761	89.55
95	77	2,998	38.94	42	9,344	222.48	119	12,342	103.71
96	72	1,260	17.50	50	11,292	225.84	122	15,761	129.19
97	71	1,894	26.68	54	17,268	319.78	125	24,528	196.22
98	72	1,935	26.88	53	10,515	198.40	125	30,143	241.14
99	76	1,595	20.99	40	9,394	234.85	116	14,386	124.02
00	71	1,132	15.94	45	16,098	357.73	116	17,865	154.01
01	66	1,888	28.61	60	25,158	419.30	126	28,474	225.98
02	45	1,522	33.82	91	18,405	202.25	136	20,657	151.89
03	40	1,161	29.03	95	19,017	200.18	135	20,366	150.86

By-Catch Model - Beam 4**BEAM 4 Analytical Bio-economic Simulation of Space structured Multi-species and Multi-fleets Fisheries**

The objective of BEAM4 (Bio-Economic Analytical Model) is to predict yield, value and a series of measures of economic performance as a function of fishery management measures such as fishing effort control, closed season, closed areas and minimum mesh size regulation.

BEAM4 is a versatile tool for the rational management of exploited living aquatic resources. It can deal with a fishery system of several stocks, several fleets, several areas (fishing grounds) and several processing plants and can account for migration of the animals as well as seasonality of recruitment. The model behind BEAM4 is an age structured cohort based fish stock assessment model combined with an economic model of both harvesting and processing sectors.

The measures of economic performance calculated by the economic sub-model include private profit, profitability, gross value added, net value added, national net value added, resource rent, employment, costs in foreign exchange and foreign exchange earnings.

BEAM4 is primarily designed for the analysis of tropical mixed fisheries with penaid shrimps as the target and finfish as the by-catch. It is, however, general, and in principle may be used to analyze any fishery. It is suitable for the analysis of resources shared between artisanal and industrial fisheries.

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Interviews

Mr. Bruce Vieira, PBS Investments

Mrs. Jean Shakoor, Shakoor's Trading

Mr. Satydeo Sawh, Minister of Agriculture

Mr. Manzoor Nadir, Minister of Tourism, Industry & Commerce

Mr. Geoff DaSilva, Executive Director, Go-Invest

Ms. Janet Kissoon, Go-Invest

Ms. Dawn Maison, Fisheries Officer, Department of Fisheries

Mr. Reuben Charles, Pritipaul Singh Investments

Mr. John Carpenter, BEV Food Processors Inc.

Mr. Mike Davis, Georgetown Seafoods

Mr. Lloyd Piggott, Association of Trawler Owners and Food Processors

Mr. Lennox Forte, Bank of Guyana

Mr. Willet Hamilton, PS, Ministry of Tourism, Industry & Commerce

Ms. Bridgette Morrison, Ministry of Tourism, Industry & Commerce

Ms. Sharon Singh, Bureau of Statistics

Mrs. Shelfraa Torrington, Bureau of Statistics

Mr. Tajnarine Geer, Mon Repos Aquaculture Farm

Mr. Bowhan Balkaran, PS, Ministry of Fisheries Crops & Livestock

Mr. Mohamed Khan, Greater Georgetown Fishermen's Coop Society

Mr. Ramgobin, #66 Fishermen's Coop Society

Mr. Baksh, Rosignol Fishermen's Coop Society

Trawler Captains – 4

Inland Fishermen – 4

Artisanal Fishermen – 8